1994

Flood Damage Survey Results

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In response to the unprecedented flooding in 1993, a project was begun in 1994 to assess immediate losses to urban trees and to monitoring future losses. The project will continue for 3 years with partial funding from the Forest Service, State & Private Forestry Division of Forest Health Protection. The goal is to describe mortality and flood impacts over time, including secondary insect and disease attack; and to develop management guidelines for urban tree managers.

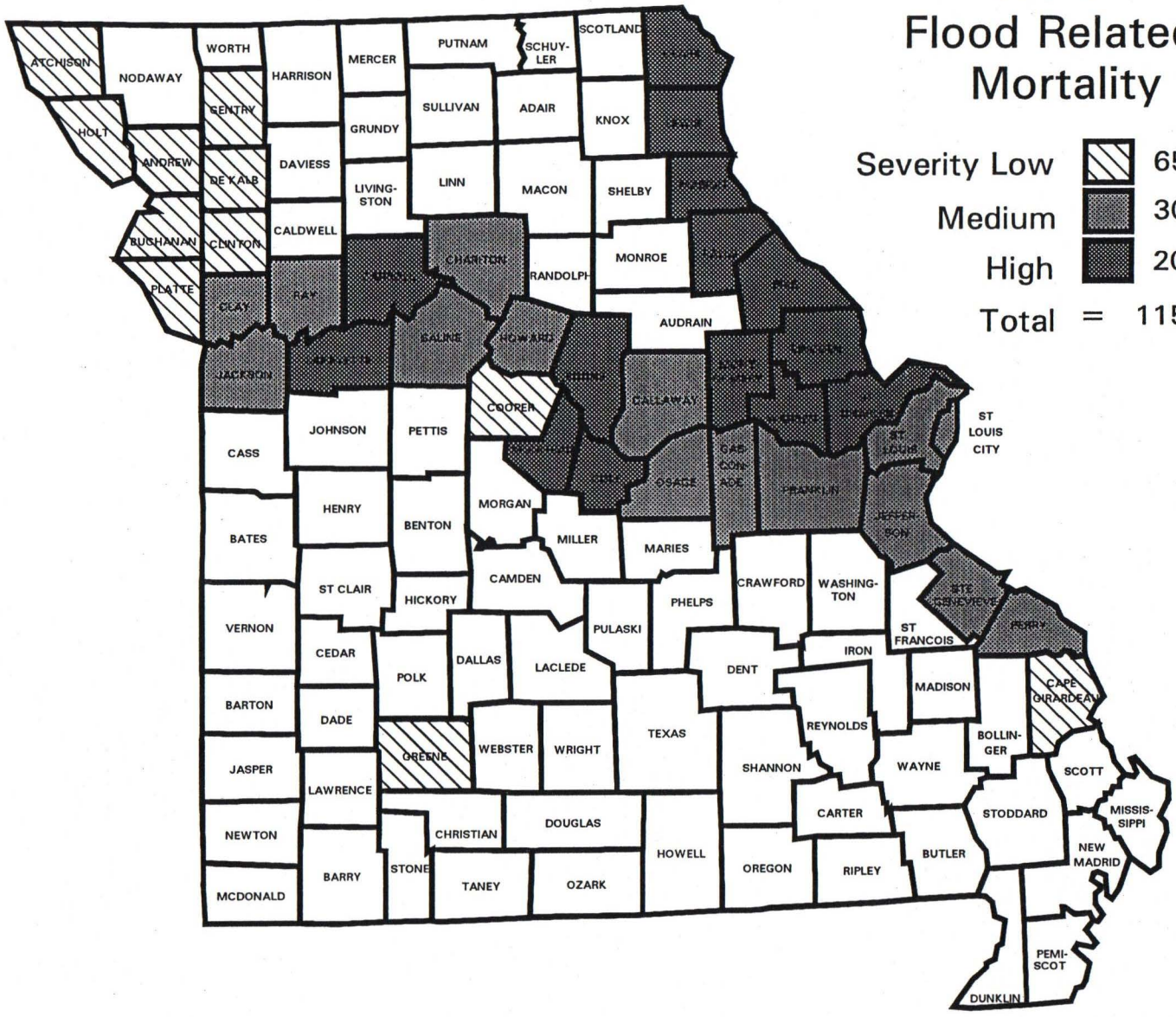
In conjunction with the urban tree study, aerial surveys were completed to determine overall losses in the Missouri and upper Mississippi river basins. The lower Mississippi river basin and major tributaries of both rivers will be surveyed in 1995. Tree mortality in 1994 exceeded 60% of the population on 20,564 acres in 12 counties (see map). Moderate levels of mortality (30 - 60%) was evident on 30,124 acres scattered across 24 counties, while 31 counties saw 10-30% mortality among flood plain trees. Trees most heavily effected were those along drainages and behind overtopped levees where water levels remained high even after initial flood waters receded. In some places water levels exceeded 15 feet for over 10 weeks during the peak growing season. As a result mortality levels are likely to remain high for the next several years.

Nine urban sites (see map) were established to monitor specific trees for secondary invasion by insects and disease organisms. Thirty trees per site were tagged, their size and condition noted, and preexisting damage described. See summaries below. The most common species represented were silver maple, sycamore, cotton wood, green ash, walnut and pin oak. Of these, all but walnut survived initial stresses well. Mortality was low although decay and wood borers may become problems in later years.

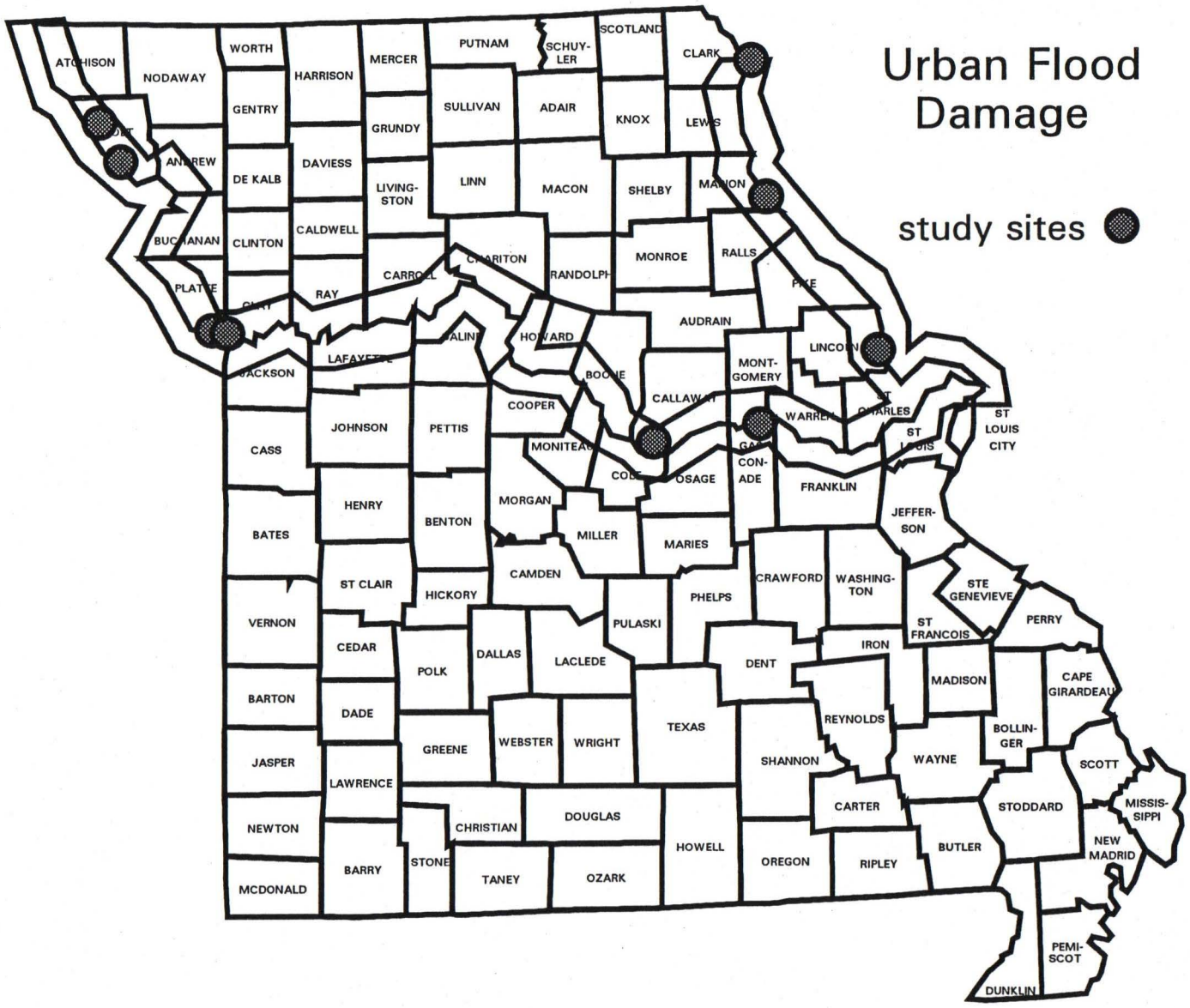
Decline symptoms were the most common type of damage noted on plot trees. These include varying degrees of die-back, small pale leaves, thin crowns, and shorter growth increments. The incidence of mechanical injury was also high. However, the majority of the mechanical wounds were not related to the flood but the proximity of man (ie mowers, cars and kids). Numerous recent bark cracks were found on some cottonwood, sycamore and silver maples. Among effected cottonwood, most seem to be producing healthy wound wood (callus tissue), unlike effected sycamores and maples. The occurrence and distribution of cracks is an interesting phenomenon not fully understood. But the lack of a response in some individuals indicates they are not likely to survive.

Tagged trees on the study plots will be monitored for the next 2 years. The results will provide some understanding of the stress and mortality associated with severe flooding. Even though the total effects of the 1993 flood may not be evident for many years to come, this study will allow for better management decisions in flood prone urban areas.

1994 Flood Related Mortality

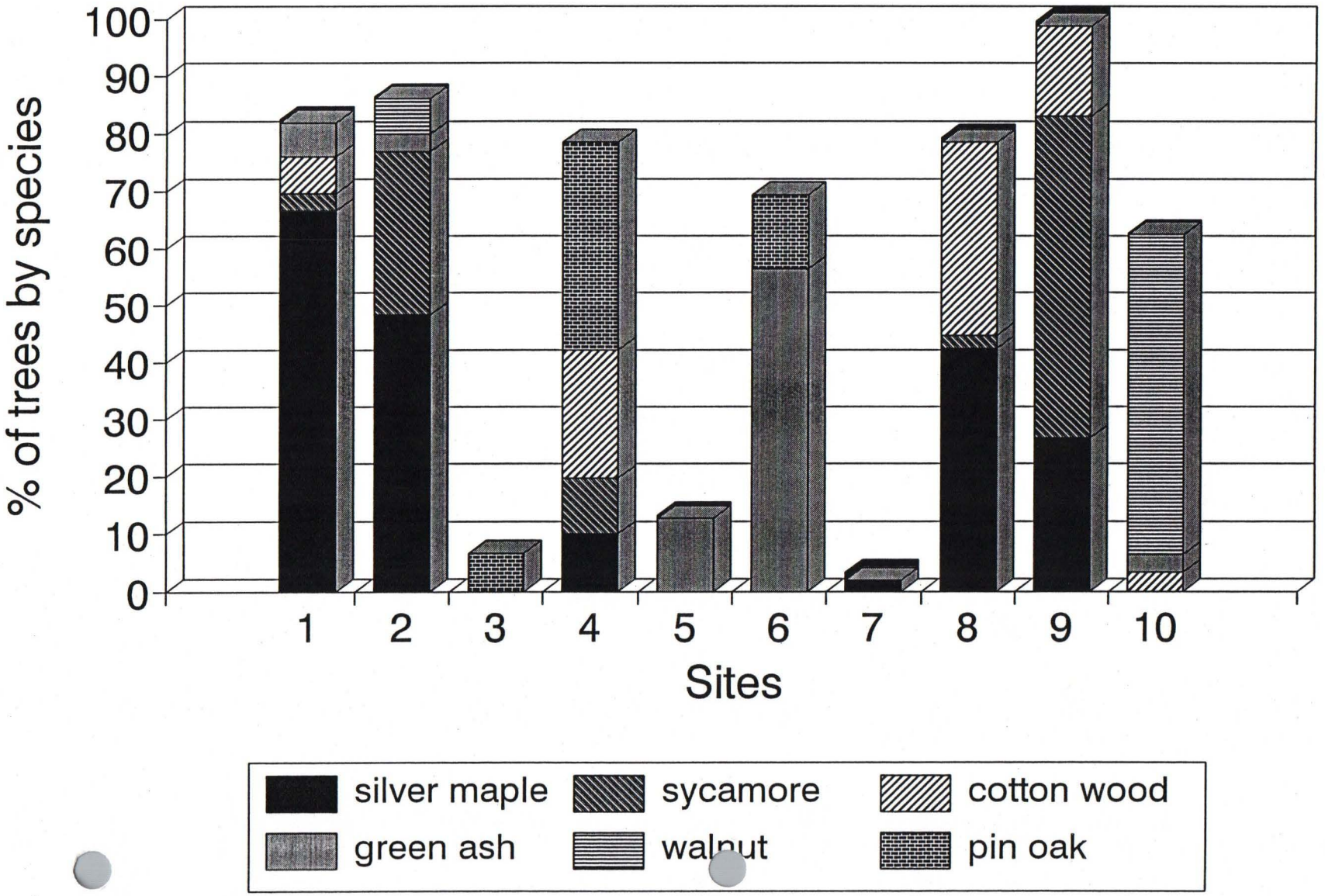


Severity Low		65,059 Ac
Medium		30,124 Ac
High		20,564 Ac
Total	=	115,747 Ac


Urban Flood Damage
study sites
ATCHISON
NODAWAY
WORTH
HARRISON
MERCER
PUTNAM
SCHUY-LER
SCOTLAND
CLARK
GENTRY
GRUNDY
SULLIVAN
ADAIR
KNOX
LEWIS
ANDREW
DE KALB
DAVIESS
LIVING-STON
LINN
MACON
SHELBY
MARION
BUCHANAN
CLINTON
CALDWELL
CHARITON
RANDOLPH
MONROE
RALLS
PLATTE
RAY
CARROLL
PIKE
AUDRAIN
HOWARD
LINCOLN
JACKSON
LAFAYETTE
BOONE
MONT-GOMERY
CALLAWAY
WARREN
ST CHARLES
ST LOUIS CITY
ST LOUIS
COOPER
CASS
JOHNSON
PETTIS
MONITEAU
OSAGE
CON-ADE
FRANKLIN
JEFFER-SON
HENRY
BENTON
MORGAN
MILLER
MARIES
BATES
ST CLAIR
HICKORY
CAMDEN
PHELPS
CRAWFORD
WASHING-TON
STE GENEVIEVE
VERNON
CEDAR
POLK
DALLAS
LACLEDE
PULASKI
ST FRANCOIS
PERRY
IRON
DENT
MADISON
CAPE GIRARDEAU
BARTON
DADE
GREENE
WEBSTER
WRIGHT
TEXAS
REYNOLDS
BOLLIN-GER
JASPER
LAWRENCE
SHANNON
WAYNE
SCOTT
CARTER
STODDARD
MISSIS-SIPPI
NEWTON
CHRISTIAN
DOUGLAS
HOWELL
BUTLER
NEW MADRID
BARRY
STONE
TANEY
OZARK
OREGON
RIPLEY
MCDONALD
PEMI-SCOT
DUNKLIN

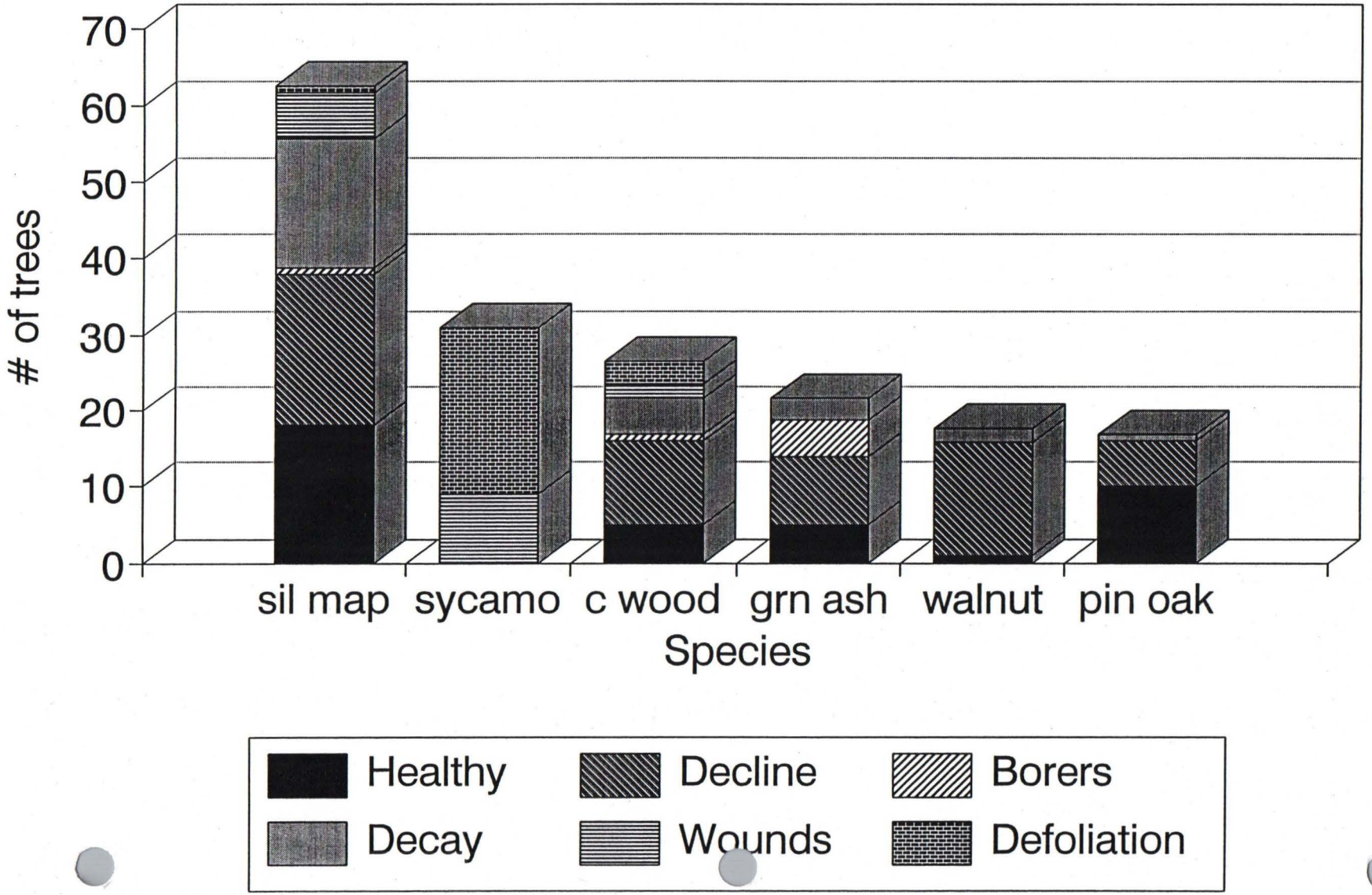
Urban Tree Flood Damage

Study Plots



Urban Tree Flood Damage

Plot Trees, All Sites



SITE SUMMARY

SITE	LAND USE	MAX FLOOD DEPTH	AVE FLOOD DEPTH	WEEKS	MAIN SPECIES	AVE SIZE (INCHES)	%DEAD
1	RESID	10	8	10	SIL MAPLE	33	22
2	PARK	20	15	10	SIL MAPLE	19	73
3	RESID	8	6	8	PECAN	16	25
4	PARK	5	3	5	PIN OAK	18	5
5A	COMM	10	4	3	LOCUST	14	5
5B	COMM	12	6	4	GRN ASH	14	5
6	COMM	12	6	3	AUS PINE	15	0
7	PARK	15	10	3	SIL MAPLE	16	4
8	PARK	3	3	1	SYCAMORE	23	0
9	RESID	2	2	1	WALNUT	18	0